The Utilization of Health Research Results in Alberta

AHFMR

ALBERTA HERITAGE FOUNDATION
FOR MEDICAL RESEARCH

Copies of this and other AHFMR publications are available at www.ahfmr.ab.ca

For more information contact:

Evaluation, Analysis, & Information Services • Alberta Heritage Foundation for Medical Research • Suite 1500, 10104-103 Avenue
Edmonton, Alberta • Canada T5J 4A7 • E-mail: richard.thornley@ahfmr.ab.ca
Tel: 780-423-5727 • Fax: 780-429-3509

The views expressed in this summary report are the authors' own and do not necessarily reflect those of the Alberta Heritage Foundation for Medical Research.

The Utilization of Health Research Results in Alberta

Prepared by

Judy M. Birdsell, Ph.D.
Richard Thornley, M.L.I.S., M.P.H.
Réjean Landry, Ph.D.
Carole Estabrooks, Ph.D.
Maria Mayan, Ph.D.

25 YEARS OF EXCELLENCE

AHFMR
ALBERTA HERITAGE FOUNDATION
FOR MEDICAL RESEARCH

The Utilization of Health Research Results in Alberta

Prepared by Judy Birdsell, Richard Thornley, Réjean Landry, Carole Estabrooks, Maria Mayan

Copyright © 2005 by Alberta Heritage Foundation for Medical Research

ISBN: 1-894927-10-9 (Print)
ISBN: 1-894927-11-7 (Online)
All rights reserved.

Design: Creative Services, University of Alberta
Editing: Natalie King

Additional information and comments relating to this report are welcome and should be sent to:

Manager, Evaluation, Analysis, & Information Services
Alberta Heritage Foundation for Medical Research
Suite 1500, 10104-103 Avenue
Edmonton, Alberta, Canada T5J 4A7
Tel: 780-423-5727
Fax: 780-429-3509
E-mail: richard.thornley@ahfmr.ab.ca

Acknowledgments

This project was made possible by the support of Health Canada, through a research grant from NHRDP (later CIHR) to Réjean Landry, and the Alberta Heritage Foundation for Medical Research. It was supported in part by the Health Research Collaboration Agreement between the Alberta Heritage Foundation for Medical Research and Alberta Health and Wellness.

The authors would like to thank the following people for their contributions to this project:

- The nurses, physicians, decision-makers, and researchers who participated in the survey.
- The individuals who participated in the stakeholder meetings and the March 24, 2004, workshop.
- Dr. Nabil Amara and Dr. Mathieu Ouimet who, in collaboration with Dr. Landry, prepared three of the technical reports (physicians, decision-makers, researchers) from which this summary was developed.
- Huey Chong, who assisted Dr. Estabrooks with the analysis of nurses data and the writing of the fourth technical report.
- The members of the Alberta Advisory Group: Dr. Paul Hasselback, Dr. Peter Norton, Dr. Kerrie Pain, Brenda Waye-Perry, and Sylvia Wilson.
- Dr. Matthew Spence, Sarah Hayward, and Dr. Jacques Magnan of AHFMR, for their support and advice.

CONTENTS

Summary 2

Introduction 2

Synopsis of knowledge utilization 2

About this report 3

Methods 4

Sampling 4

Data collection 5

Data analysis 5

Ethics approval 6

Description of the samples 6

Key Findings 8

Sources of information 8

Research utilization by users 8

Research transfer by researchers 10

Determinants of research utilization 11

Determinants of research transfer 15

Determinants of research utilization for users and researchers 17

Conclusions 18

Questions for Future Consideration 19

A Final Note 20

Notes 20

References 21

Appendix A: Objectives of the National Study 22

Appendix B: Alberta Advisory Group 22

Appendix C: Stakeholder Representatives 23

Appendix D: Workshop Participants 24

Appendix E: Related Research Utilization Activities and Programs 26

About the Authors 27

105-07553/

Summary

Increasing demands for "evidence-based" practice in the healthcare field raise questions about how knowledge is used and the most effective ways to communicate it so as to bridge the gap between research and practice. This report is based on a national study initiated in 2000 by Dr. Réjean Landry of Laval University, evaluating how health *researchers* transfer their research findings and how *research users* (decision-makers and physicians) use the findings to inform their work. An Alberta Advisory Group collaborated with Dr. Landry to adapt his study to Alberta's needs, as well as broadening the study to include nurses in the users group.

Surveyed by telephone, *researchers* rated (a) their engagement in research transfer activities, and (b) certain factors that are thought to influence the extent to which they communicate their research findings. Individuals from the three *research user* groups rated (a) the frequency of their use of a variety of information sources, (b) the frequency of their research use, and (c) factors thought to influence their research use. Modelling the interactive nature of research transfer confirmed by the study, the Alberta Advisory Group also organized a number of workshops aimed at bringing the study's findings to the attention of stakeholders and seeking their assistance in interpreting the study's results.

Four main conclusions emerged from the survey's findings and stakeholder workshops:

- **Relationships foster research transfer and use.** Users and researchers must interact. Time invested in networking and developing relationships is time well spent; however, this is often a luxury in the current healthcare system. Such interaction does not translate immediately into measurable outcomes, and consequently, users and researchers are generally not rewarded for it.
- **Organizational cultures supporting research transfer and use need encouragement.** The extent to which an organization creates opportunities for interaction is one measure of its ability to create or foster conditions favourable to research use. Organizations should establish incentives for transfer and use of research. The case needs to be presented more emphatically that research transfer and use are beneficial activities.
- **Users must consider research relevant and credible in order for transfer and use to take place.** Positive attitudes toward research should be encouraged. This can be enhanced by making the links between research and its relevance or utility to users' work clear. Activities aimed at researchers should stress the importance of linking their research with users' needs.
- **Specific roles and responsibilities within occupational groups may optimize research transfer and use.** To optimize research transfer and use, the roles of users and researchers more inclined toward this activity need to be identified, and the people already engaged in this activity should be acknowledged. Processes to encourage and support the use of research can then be tailored to each group.

Introduction

In recent years the concept of "knowledge utilization" has received a great deal of attention in healthcare. Whether one's focus is on the production of knowledge, its dissemination, or its use, addressing the question of knowledge utilization is no longer optional. Increasingly, in all fields of healthcare, practitioners, decision-makers, and policy-makers—those on the uptake side—are being urged to use evidence to inform their practice. And gradually, funders are requiring researchers—those on the production side—to detail and implement plans for knowledge transfer.

But using or transferring knowledge so that it will inform practice or decision-making is much more complex than it sounds. In fact, knowledge utilization has developed into a specific area of study, with its own publications, its own presentation venues, and its own academic and practice literature.

This report details the findings from surveys about research utilization of four occupational groups in Alberta: three on the knowledge uptake side (i.e., nurses, physicians, and decision-makers) and one on the knowledge production side (i.e., researchers).

Synopsis of knowledge utilization

Since the introduction of Rogers' diffusion of innovation theory in 1962 (Valente & Rogers, 1995), the knowledge

utilization literature has evolved toward building theory and supporting practice across disciplines and practice settings. Indeed, Rogers' paradigm prepared the way for studies of knowledge utilization and helped spread this concept to fields as diverse as public health, economics, geography, marketing, political science, and communications.

In spite of these efforts to encourage decision-making based on research, however, problems remain: research results are underutilized; decisions are based on incomplete scientific evidence (Peachey & Linton, 1990; Leung, 1992; Lester, 1993; Lomas 1997); and in healthcare, evidence resulting from research fails to have an impact on practice (Haynes, 1993).

Models of knowledge utilization discussed in the literature focus on four major alternatives (Weiss, 1979; Kline & Rosenberg, 1986; Yin & Moore, 1988; Landry, 1990). The *science-push* (technological) model stresses the supply of high-quality research findings as the major determinant of research utilization, other determinants being such factors as content attributes, type of research, research domains, and discipline. The *demand-pull* (economic) model shifts the initiative to the users, who define the problems and ask researchers to conduct research that contributes to solving specific problems (Weiss, 1979; Yin & Moore, 1988; Rich, 1991). However, Landry et al. (1998) found that among different social science disciplines, research results that focused on users' needs showed no higher likelihood of use than those focusing primarily on the advancement of knowledge. The *dissemination* (institutional) model addresses this by recommending that research activities include dissemination mechanisms to identify useful knowledge and transfer it to potential users. The main shortcoming of this model is that potential users are involved in neither the selection of the transferable information nor the production of research results.

The *interaction* (social interaction) model was developed to address the limitations of the previous models (Dunn, 1980; Yin & Moore, 1988; Huberman & Thurler, 1991; Landry et al., 1998). It predicts that the more sustained and intense the interaction between researchers and users, the more likely it is that the research will be used. This model explains utilization in terms of types of research output, the organizational interests of those who use the research, efforts to disseminate it, and mechanisms that promote linkages between researchers and users. The study described in this report reflects this model of knowledge utilization.

As well as trying to describe the process of knowledge utilization, a number of models have also considered the *ways* in which knowledge is used.

> "Conceptual" use of knowledge refers to instances where knowledge provides new ideas, theories, or hypotheses that lead to new interpretations of issues in the practice or decision-making context, without inducing changes in decisions (Landry, Amara, & Lamari, 2001).

> "Symbolic" use of knowledge occurs when practitioners and decision-makers use knowledge to legitimate their views and practices, but—as with the conceptual use of knowledge—practice, policy, and procedure do not change as a result of the knowledge (Landry, Amara, & Lamari, 2001).

> "Instrumental" use is "acting on research in specific and direct ways, such as solving a particular problem at hand" (Lavis, Ross, Hurley et al., 2002, p. 136).

The Knott and Wildavsky scale (1980) was developed to measure research utilization, including a broad set of uses and observable behaviours. Lester and Wilds (1990) and Lester (1993) used this scale to derive an index based on seven cumulative stages of utilization by state agency officials: reception, cognition, reference, effort, adoption, implementation, and impact. The scale was slightly modified by Landry et al. (1998) and applied in a study of the utilization of social sciences research.

That 1998 scale, again modified, was used in the present study of knowledge utilization by decision-makers, physicians, nurses, and researchers in Alberta.

About this report

In 2000, Dr. Réjean Landry[1] and colleagues at Université Laval initiated a national survey of research utilization by three occupational groups: decision-makers, physicians, and researchers. In evaluating the use of health research results in the Canadian healthcare system, the ultimate aim of this national study was to narrow the gap between the creation of research and its use. (See Appendix A for the specific objectives of the national study.)

The Alberta Heritage Foundation for Medical Research (AHFMR) strongly supported this research and convened an Alberta Advisory Group, led by Dr. Judy Birdsell, to adapt the

national survey to Alberta's needs[2]. (See Appendix B for a list of the Advisory Group's members.) The Foundation's goal was to strengthen the health knowledge utilization infrastructure of Alberta. The Alberta Advisory Group worked with Dr. Landry to meet the following objectives:

1. Capture information about the current state of research utilization among key groups[3] in order to enable longitudinal comparisons.
2. Facilitate analysis that will inform future action related to research utilization in Alberta.
3. Increase the statistical power within the national study by increasing the size of the Alberta sample, thereby allowing more inter-group comparisons (Alberta compared to other provinces) of certain variables[4].
4. Increase the interpretive value of the national survey within Alberta by adding questions specific to Alberta.
5. Extend the interpretive value of the national survey across health disciplines by surveying Alberta nurses.

Methods

This report summarizes the findings of surveys conducted within four Alberta occupational groups (decision-makers, physicians, nurses, and researchers) and designed to determine the sources of information they use in their daily practice, to what extent they use that knowledge, and the factors that influence them to use research in their work.

The findings presented here derive primarily from four technical reports, one for each occupational group. These reports, which contain a certain amount of information and analyses that do not appear in this summary report, may be obtained by contacting AHFMR. The technical report on the survey of nurses is also available on the Knowledge Utilization Studies Program website at http://www.nursing.ualberta.ca/kusp/.

Sampling

Representative sampling was the goal for each of the four target groups. The specific sampling techniques depended on the group, as well as the availability and reliability of lists or databases which identified individuals in each professional group. Where possible, random selection was used in recruiting individuals with certain characteristics (e.g., occupational group, particular role).

In many of the tables, numbers and percentages do not add up to the total sample or to 100%. This is partly attributable to invalid survey responses, and partly to the fact that not all respondents answered all the questions.

Decision-makers

In this study "decision-makers" were managers and administrators from government agencies, regional health authorities, and healthcare facilities. Three sources of information were used to identify decision-makers: (a) an electronic database compiled by HEAL*Net*[5], which provided contact information for CEOs from regional health authorities; (b) *Scott's Government Index* (2001), which provided contact information for decision-makers in health ministries and agencies; and (c) the *Canadian Health Facilities Directory* (2001), which provided contact information for decision-makers in Alberta hospitals. Potential respondents were identified by a referral process that involved calling the support person to the senior executive (the CEO, for example, in the case of health regions) and asking to talk to the person responsible for one of four areas: hospital or acute care, community care, population or public health, or long-term or continuing care. In 25% of cases callers attempted to interview the senior administrator; and in 75% of cases, they asked to speak with a manager reporting to the senior administrator. While the aim was to have 200 decision-makers involved in the study, only 98 participated.

Physicians

The *Canadian Medical Directory* (2000 edition) was used to draw the sample of physician-respondents. After retired practitioners had been removed from the pool, physicians were randomly selected. As with the decision-makers, the aim was to have 200 physicians involved in the study. By the conclusion of the study, 69 physicians had participated. Initially, the physician sample was stratified into three groups: physicians practising general medicine, physicians practising laboratory medicine, and physicians practising surgery. Because of the small number of physicians responding to the survey, these three groups were later aggregated into two: "generalists", which comprised the physicians practising general medicine; and "specialists", which

included the physicians in the other two groups.

As has already been noted, the rate of physicians' response to the survey was quite low. Data from those physicians who did respond suggest that they may have been more active in research than the "average" Alberta physician. Indeed, participating physicians described themselves as highly involved in research: on average, they reported spending almost 12% of their time on research activities. This suggests that this study's findings relating to physicians, while possibly representative of research-oriented physicians, are probably not representative of Alberta physicians in general.

Nurses

The Alberta Association of Registered Nurses (AARN) provided the sampling framework for the survey of nurses. Only nurses who consented on their 2002 AARN registration forms to participate in research activities were included in the potential sample pool. From this pool, nurses were included if they identified themselves as staff nurses, clinical nurse specialists, educators, managers/supervisors, or senior managers. The sample was stratified by region size (rural, small urban, and urban regions) and nurse group (staff nurses, nurse educators, and nurse administrators). A total of 408 nurses participated, representing a response rate of 87.2%.

An analysis of "intermediaries"—those who perform their role in the system between front-line care and knowledge sources—was possible only with the data set for the nurses. Throughout this report, references to intermediaries indicate individuals fulfilling that role in a nursing context (i.e., nurse educators).

Researchers

Websites of the faculties of medicine at the universities of Alberta and Calgary were used to identify researchers from those faculties (the "medical school sample"). Health researchers from all other faculties (the "supplementary sample") were identified from lists provided by AHFMR and the research offices of Alberta universities. The response rate from researchers was 60.3%; 251 researchers participated.

Data collection

Telephone interviews were used to collect data from all respondents. The decision-maker, physician, and researcher telephone surveys were conducted by Infras Inc., a private firm from Quebec. The University of Alberta's Population Research Laboratory interviewed the nurses.

Data were collected in four main areas:

- Demographics included factors such as employment status, age, education, job responsibility and setting, time spent on job activities, and nature of research involvement. Many demographic items were examined as independent variables, to determine their effect on research utilization behaviour.
- Sources of information were investigated by asking respondents to rate their daily use of various information sources.
- Research utilization was measured, as a dependent variable, by examining the extent or level of research utilization among respondents.
- Determinants of research utilization were defined as factors which influence users to use research in the course of their daily activity; these factors were examined as independent variables.

Scales for measuring the extent of research utilization and the determinants of research utilization were used almost identically with each of the three user groups (i.e., decision-makers, physicians, and nurses), slight modifications being made only to ensure relevance. In the case of researchers, a different scale was used, to assess determinants of research transfer rather than research utilization.

Data analysis

The analyses conducted for this study varied. The technique used for each finding is included in the discussion of the findings.

Regression modelling was performed for the determinants of research utilization. Multiple regression examines the relationship between several independent variables and a dependent variable. In this study, the dependent variables considered were research utilization (in the case of decision-makers, nurses, and physicians) and research transfer (in the case of researchers). One primary purpose of this study was to explore the relationship between these dependent variables and a range of other variables (for example, the age and education of those surveyed) which are termed independent variables.

Involvement of Alberta stakeholders in data analysis and interpretation

The Alberta Advisory Group organized a number of events aimed at increasing the relevance of this study's results to stakeholders and providing them with learning opportunities. The surveys of decision-makers, physicians, and researchers were conducted in 2001, followed by the survey of Alberta nurses in 2002. After the data were collected, stakeholders were invited to meet, to review their own group's results and respond to the researchers' presentation and interpretation of results. (See Appendix C for a list of the individuals who participated in this process.) The final analysis was completed in late 2003, after which, technical reports for each occupational group were written. A final stakeholder workshop, including representatives from all occupational groups, was held in the spring of 2004 to seek reaction to the technical reports and further interpretation. (See Appendix D for a list of the individuals who participated in this workshop.) The comments arising from this workshop are incorporated into the Conclusions of this report.

Ethics approval

This study received ethics approval from the following bodies: the University of Alberta Health Research Ethics Board, the University of Calgary Conjoint Health Research Ethics Board, the Community Research Ethics Board of Alberta, and the Chinook Health Region.

Description of the samples

Users

Characteristics of the decision-maker, physician, and nurse samples are presented in Table 1.

Decision-makers were predominantly female, held bachelor's or master's degrees, worked in regional health authorities, were professionals and managers, and spent most of their time doing administrative work.

Most physicians were male and practised general medicine; they had spent an average of 19 years in practice. Physicians reported spending most of their time in clinical practice. A greater proportion of generalists than specialists worked in public or population health and long-term or continuing care.

The majority of nurses were female, worked full-time, and were either diploma-level or baccalaureate-trained. Most were staff nurses or community health nurses, had clinical responsibilities, and spent the bulk of their time working in a hospital setting. Reflecting this, more than half of the nurses reported hospitals as their primary work setting. Because of quota sampling, the distribution of nurses' primary employers by regional health authority (RHA) and site was quite even across the three regional groupings: urban, small urban, and rural.

Beyond this description of the nurse sample, some analyses were performed to find a correlation between (a) region size (urban, small urban, and rural) and time spent involved in research and in teaching; and (b) occupational subgroup (staff nurses, nurse educators, and managers) and time spent on research, teaching, clinical practice, and management*.

Researchers

Characteristics of the researchers in the medical school sample and in the supplementary sample are presented in Table 2.

In general, medical school researchers were male, and almost half were at the full-professor level. The three types of work settings where researchers carried out their research activities were not mutually exclusive; medical school researchers carried out their research activities in universities, as well as in teaching hospitals. Medical school researchers spent just over half their time doing research. Many in the medical school sample were applied researchers (61.7%; n=79), while the others (38.3%; n=49) were basic researchers.

The supplementary sample of researchers was divided equally between male and female, and half were at either the full-professor or associate-professor level. Supplementary sample researchers carried out their research activities in universities as well as in teaching hospitals. They spent just under half their time doing research, and spent a large proportion of their time teaching. Most in the supplementary sample were applied researchers (79.5%; n=89); the remainder were basic researchers (20.5%; n=23).

By comparison with the medical school sample, the supplementary sample comprised more female researchers. Slightly more junior, the supplementary sample researchers had less research experience, but more experience as healthcare providers or managers. They spent less time researching and more time teaching.

Table 1: Sample characteristics of research users

		Decision-makers	Physicians	Nurses
Sample size		**N=98**	**N=69**	**N=388**
Sex	Female	73.5% (n=72)	24.6 % (n=17)	95.6% (n=371)
	Male	26.5% (n=26)	73.9% (n=51)	4.4% (n=17)
Role	Professional	45.9% (n=45)	n/a	n/a
	Manager	54.1% (n=53)	n/a	n/a
	General	n/a	78.3% (n=54)	n/a
	Lab	n/a	15.9% (n=11)	n/a
	Surgeon	n/a	5.8% (n=4)	n/a
	Staff	n/a	n/a	42.5% (n=165)
	Educator	n/a	n/a	16.0% (n=62)
	Manager	n/a	n/a	29.6% (n=115)
Mean % of time spent	Administrative work	69.8% (n=96)	8.1% (n=64)	25.7% (n=382)
	Research	16.1% (n=86)	11.8% (n=65)	10.3% (n=383)
	Teaching/Education	9.9% (n=87)	8.3% (n=64)	24.0% (n=383)
	Clinical Practice	8.1% (n=75)	72.8% (n=65)	38.3% (n=383)
% with research involvement	Contributed data from their organization	85.7%	n/a	n/a
	Involved in outcomes, evaluation, or quality assurance	82.7%	63.6%	65.0%
	Collected data for a research study	67.3%	80.3%	55.1%
	In-depth literature reviews	62.2%	70.3%	45.2%
	Involved in a study that combined university and non-university investigators	55.1%	48.5%	34.5%
	Been a principal investigator	14.3%	47.0%	6.8%
	Been a co-investigator	32.7%	54.4%	13.1%
	Local investigator for a multi-site pharmaceutical project	n/a	40.9%	n/a

Table 2: Sample characteristics of researchers

		Medical school sample	Supplementary sample
Sample size		**N=128**	**N=112**
Sex	Female	25.8% (n=33)	49.1% (n=55)
	Male	74.2% (n=95)	50.9% (n=57)
Role	Full professor	49.2% (n=61)	40.2% (n=43)
	Associate professor	30.6% (n=38)	33.6% (n=36)
	Assistant professor	20.2% (n=25)	26.2% (n=28)
Basic or applied	Basic researcher	38.3% (n=49)	20.5% (n=23)
	Applied researcher	61.7% (n=79)	79.5% (n=89)
Time spent	Administrative work	17.1% (n=125)	18.4% (n=106)
	Research	53.9% (n=128)	46.5% (n=112)
	Teaching	19.1% (n=126)	29.3% (n=110)
	Clinical practice	11.6% (n=98)	9.3% (n=90)
Years of experience after graduating	In research	17.3 (n=127)	13.6 (n=111)
	As healthcare provider or manager	8.9 (n=98)	10.6 (n=99)
Where research is carried out	University	97.7% (n=125)	94.6% (n=106)
	Teaching hospital	57.0% (n=73)	32.1% (n=36)
	Other type of hospital	7.8% (n=10)	9.8% (n=11)

Key Findings

Key findings in this study focus on sources of information the subjects used in their daily practice, the extent of their use of research, and the factors that determined their research utilization or transfer.

Sources of information

Research users were asked to rate their daily use of various information sources by frequency of use in daily practice. A five-point Likert scale was used to score each item: 1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*, and 5 = *very often*. The top ten sources of knowledge most frequently used by decision-makers, physicians, and nurses are reported in Table 3. The rankings are based on the percentage of respondents reporting use of the source *often* or *very often*.

These results suggest that all users frequently turn to each other (staff, colleagues, other healthcare professionals) as sources of information, which highlights the importance of interaction and person-to-person contact as media of research transfer. With the exception of physicians, who reported more frequent use of original studies published in scientific journals, these findings also confirm that published research has to compete with many other sources of information. The documents that nurses and decision-makers reported using most frequently tended to be internal to the organization or profession. This highlights the importance of internal ownership of research and evidence, whether it is brought in from the outside (by an internal sponsor, for example), or whether it is produced by the organization itself. Overall, combinations of sources—including person-to-person exchange and a variety of documents—play complementary roles as sources of information for decision-making, confirming that research transfer is a complex process.

Research utilization by users

The extent of research utilization was measured by an index that was created following Landry, Amara, and Lamari (2001a; 2001b); Landry, Lamari, and Amara (2003); and Landry, Amara, and Ouimet (2003). A list of statements for scoring by respondents consisted of six items (seven, in the case of decision-makers). The ratings given by each individual were summed to provide a general research utilization score for each respondent (not shown). Each item was scored on a five-point Likert scale: 1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*, and 5 = *very often*. For each item, descriptive statistics were obtained by averaging the sum of the responses of all the decision-makers, all the physicians, and all the nurses. These are reported in Tables 4 and 5.

Decision-makers

Decision-makers' average scores on the extent of their research utilization hovered between 3 *(sometimes)* and 4 *(often)*. The highest average (3.85) was for the statement *I have read and understood the research reports that I have received*. Not surprisingly, the lowest average (3.36) was for the most instrumental form of research utilization, as represented by the statement *The utilization of research evidence has led to concrete changes in the programs or services provided by my organization*.

There were no significant differences in research utilization by decision-makers between subgroups (i.e., professionals, managers) or types of organizations (i.e., healthcare facilities, provincial ministries/agencies, RHAs). However, decision-makers from small urban centres—Lethbridge, Medicine Hat, Red Deer, and Fort McMurray—did score research use higher, on average, than decision-makers from the large urban centres, Edmonton and Calgary. No significant differences were seen between large urban regions and rural regions, or small urban regions and rural regions.

Physicians

Physicians scored all variables (except one: the citing of research results as a reference) slightly higher than decision-makers. While most responses again hovered between 3 *(sometimes)* and 4 *(often)*, two responses fell between 4 *(often)* and 5 *(very often)*. As with the decision-makers, the highest rating (4.06) was for the statement *I have read and understood the research reports that I have received*—which might be characterized as conceptual use of research. The other response that scored very high (4.01) was for the statement *Research evidence has led me to make professional choices and decisions that I would not have made otherwise*—an instrumental use of research. The lowest average (3.62) was for a response that touches upon the relationship between the physician and colleagues or patients: *I have cited research evidence to colleagues or patients as a reference in my professional practice*.

In further analyses, no significant difference in research utilization was observed between specialists and generalists; however, Calgary and Edmonton physicians reported significantly higher research use, on average, than physicians practising in the rest of Alberta.

Table 3. Sources of knowledge most frequently used by reserch users

	Decision-makers	Physicians	Nurses
1.	Documents produced within my own organization	Original studies published in scientific journals	Personal experience
2.	**Management staff of my organization**	**Information from specialists**	**Information from other nurses**
3.	Internet searches	Computerized literature search (e.g., MEDLINE)	Continuing education
4.	Documents produced by other government agencies, RHAs, or healthcare facilities	**Information from colleagues**	In-services and conferences
5.	Evaluation reports for a project that you were personally involved with	Publications that focus on evidence-based medicine	Information learned about each patient as an individual
6.	Databases (e.g., CIHI, cancer registries, Child Health Survey)	Presentations and seminars	Information on patients (e.g., charts)
7.	**Front-line staff of my organization**	Clinical guidelines	Policy and procedure manuals
8.	Bulletins and newsletters	Systematic reviews (including meta-analyses)	Clinical practice guidelines
9.	Clinical practice guidelines	Clinical practice guidelines	What has worked for you for years in daily practice
10.	Presentations and seminars	Conference proceedings	**Information from other healthcare professionals**

Note: Sources of knowledge are listed in descending order of perceived frequency of use (from most to less frequently used). Items in **bold** *involve social interaction; underlined, organized learning opportunities; in red, practice guidelines. Other sources that were reportedly less frequently used than those listed in this table are detailed in the user technical reports.*

Table 4. Questions to Alberta users about research utilization

During the last five years ...	Decision-makers	Physicians	Nurses
I have received research results concerning • the areas for which I am responsible. *(decision-maker)* • my field of professional practice. *(nurse, physician)*	3.66	3.82	3.45
I have read and understood the research reports that I have received.	3.85	4.06	3.54
I have cited research evidence to colleagues or patients as a reference • in my work. *(decision-maker)* • in my professional practice. *(nurse, physician)*	3.63	3.62	3.51
I have adapted the format of the research results to provide information useful to our decision-makers. *(decision-maker only)*	3.41	n/a	n/a
I have made efforts to promote the adoption of research evidence in my field.	3.59	3.79	3.47
Research evidence has led me to make professional choices and decisions that I would not have made otherwise.	3.46	4.01	3.60
The utilization of research evidence has led to concrete changes • in the programs or services provided by my organization. *(decision-maker)* • in my professional practice. *(nurse, physician)*	3.36	3.88	3.51

Table 5. Additional questions to Alberta nurses about the extent of their research utilization

Overall in the past one year, how often have you...	Average Score
Used research in some aspect of your nursing practice?	3.89
Used research findings in a direct way in some aspect of your nursing practice? *(instrumental)*	3.59
Used research findings in a non-direct way in some aspect of your nursing practice? *(conceptual)*	3.78
Used research findings in a persuasive way in some aspect of your nursing practice?	3.05

Nurses

On average, nurses scored all items in the research utilization scale lower than physicians, and most items lower than decision-makers; average responses again hovered between 3 *(sometimes)* and 4 *(often)*. The highest average (3.60) was for the statement *Research evidence has led me to make professional choices and decisions that I would not have made otherwise.* The lowest average (3.45) was for the statement *I have received research results concerning my field of professional practice.*

In addition to the above questions, nurses were asked how often, in the past year, they had used research in a general way, in a direct (instrumental) way, in an indirect (conceptual) way, or in a persuasive way. These items were scored on the same 5-point Likert scale as the other utilization questions. The averages on these items again fell between 3 *(sometimes)* and 4 *(often)*. They are reported in Table 5. Nurses scored the general use of research in their nursing practice highest; averages dropped sequentially for use in a non-direct (conceptual) way, use in a direct (instrumental) way, and use in a persuasive way. On average, educators scored all research utilization measures higher than staff nurses and managers; and overall, groups of nurses from different regions did not differ significantly in their mean research-utilization scores.

Summary: research utilization by users

Overall, physicians scored the highest for self-reported research utilization, followed by decision-makers, and then nurses. While the real-world significance of these self-reported differences remains to be explored, a number of observations may be made.

Research evidence seems quite important for physicians' decision-making. Physicians scored the last two items on the list very high (evidence leading to decisions that would not have been made otherwise, and research evidence leading to concrete changes). However, the higher scoring by physicians may be related to the tendency of the sampled physicians to be more "research-centric" than the average physician.

The decision-makers' trajectory is the closest to what one might expect. For the most part, their average scores decreased as the level of involvement in research utilization increased. Their highest score was for the most limited form of utilization (i.e., reading and understanding reports); and their lowest score was for the last item, which reflects the most instrumental use of research (i.e., making concrete changes to organizational programs or services).

What stands out among the nurses' scores is their highest average (3.60) for the item *Research evidence has led me to make professional choices and decisions that I would not have made otherwise.* Nurses clearly indicated that they used evidence to make decisions. As to the additional questions that were asked of nurses, their lowest score—for *using research findings in a persuasive way*—makes sense intuitively. This was likely due to the preponderance in the sample of staff nurses with clinical responsibilities; if more nurses in the sample had been educators, the score for using research in a persuasive way might have been higher.

Research transfer by researchers

This section of the report examines the extent to which researchers—those in medical schools as well as those in faculties other than medicine (the "supplementary sample")—engaged in research transfer activities. The research-transfer effort index reflects the intensity of researchers' involvement in four types of research transfer activities, as measured on a 5-point Likert scale: 1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*, and 5 = *very often*. For each individual, responses to the four items were summed to produce the general research-transfer score for each researcher (not shown). The average response to each item in the two samples is reported in Table 6.

In general, the scores of both groups of researchers were quite low, falling between 2 *(rarely)* and 3 *(sometimes)*. The one item on which both groups scored highest—between 3 *(sometimes)* and 4 *(often)*—was the statement *I have been invited to present my research results to groups who could make direct use of them.* The supplementary sample scored all items higher than did the medical school sample, but the differences in means were not statistically significant, suggesting that there was no difference in research transfer effort between the two samples.

However, the comparison of means (independent-sample T-test) of research transfer effort between work settings for the medical school researchers indicates that, on average, the scores of researchers who carried out their research activities in both a university and a hospital were significantly higher on the research-transfer effort index than those of the researchers who carried out their research activities in a university only. The same results were found for the supplementary sample.

Table 6. Extent of research transfer by Alberta researchers

During the last five years ...	Medical school sample	Supplementary sample
I have sent my research results to physicians, healthcare professionals, or managers of health delivery organizations.	2.46	2.70
I have been invited to present my research results to groups who could make direct use of them.	3.30	3.42
I have been asked to sit on working groups that were involved in efforts to directly apply new knowledge, including my own research.	2.63	2.96
In recognition of my research work, I have worked as a consultant with groups who deliver patient care.	2.13	2.72

Following the examination of the extent of research transfer by researchers, their perception of the impact of their research on policies and practice was also considered. Respondents were asked if, during the last five years, (a) the use of their research results had generated formal changes in policies or procedures, and (b) the use of their research results had generated concrete changes in professional practices or health services. The degree to which respondents perceived that their research results had impacted on policies and professional practice was measured with a 5-point Likert scale, where 1 = *never*, 2 = *rarely*, 3 = *sometimes*, 4 = *often*, and 5 = *very often*.

Overall, the results show that the researchers' perception of the impact of their work is quite low. Indeed, 61.7% of the medical school researchers and 52.7% of the supplementary sample declared that, in the previous five years, the use of their research results had *never* or *rarely* generated formal changes in policies or procedures. Only 7.8% of the medical school sample and 6.3% of the supplementary sample declared that, in the same period, the use of their research results had *often* or *very often* generated formal changes in policies or procedures.

As for the second item concerning perceived impact, 57.8% of the researchers from the medical schools and 51.8% of the supplementary sample declared that, in the previous five years, the use of their research results had *never* or *rarely* generated concrete changes in professional practice or health services. Only 7.0% of the medical school sample and 7.2% of the supplementary sample researchers declared that the use of their research results generated concrete changes in professional practice or health services *often* or *very often*.

Summary: Research transfer by researchers

Instead of sending out results, it seems that researchers wait to be invited to present their results to groups who could make direct use of them. Presenting research results was, by far, the highest-scoring item on the research transfer index. This nicely parallels the finding that presentations, seminars, in-services, and conferences were significant sources of information for all user groups. However, when researchers responded that they presented to "groups who could make direct use of results", they may have been thinking of fellow researchers—who do use results, but for further research purposes—as opposed to health providers or policy-makers.

In addition, both sitting on working groups and working as a consultant yielded low scores. This is plausible, as both involve relationship-building, which takes time: time away from researchers' main role of research and publication. Research relationships do not translate well into annual reviews and performance appraisals; and thus, there is less incentive for researchers to take the time to develop them.

Finally, researchers who carried out their research activities in both a university and a hospital scored higher on the research-transfer effort index than did the researchers who carried out their research activities in a university only. This may mean that working in a hospital, in contact with users of the research, may increase research transfer. Again, this argues for increased contact and interaction between researchers and users.

Determinants of research utilization

Determinants of research utilization are those factors that influence the extent to which people use research in their daily activities. This study performed regression analysis—a technique which uses the correlation between two variables to predict one from the other—to reveal the independent variables that are significantly associated with research utilization (the dependent variable) among decision-makers, physicians, and nurses in Alberta. Three categories of independent variables were considered:

"The Individual" category includes variables that are characteristics and actions of the respondent.

"The Context" or "the Organization" (depending on the sample group) describes the range of settings or attributes of the setting in which the respondent worked.

"The Research" category relates to adaptation of the research product and other efforts applied to the research to increase research uptake.

Note that for all sample groups, positive correlation is assumed unless otherwise indicated.

Decision-makers

In the "Individual" category (see Figure 1), four variables significantly predicted research utilization among Alberta decision-makers.

With regard to the first variable, *attitudes toward research*, research utilization was greater for those decision-makers who reported that research is very often pertinent in their professional practice, meets their needs, and is a preferred source of information. Second, greater *person-to-person contact with researchers* from universities, hospitals, government agencies, and private firms was also associated with increased research utilization. Third, the results affirmed that *exposure to research-oriented products and events* was significantly related to research utilization, including such linkage mechanisms as participating with researchers in research projects, in conferences and workshops, and on expert panels and committees; and receiving research reports through a variety of channels.

The fourth variable, *research experience*, was included in the regression analysis for decision-makers only. It measured the respondents' involvement in research during the previous five years: as a principal investigator; as a co-investigator; having collected data; having contributed organization data; having been involved in outcomes, evaluation, or quality-assurance projects; and/or having carried out in-depth reviews of the literature. Involvement in this type of activity was predictive of research utilization by decision-makers.

Seven variables were shown to be not predictive of research utilization by decision-makers. In the "Individual" category, *professional status* (the status of a professional as opposed to that of a manager) and *education* proved not to be significant determinants of research use. In the "Research" category, the *adaptation of research* into user-friendly form was not significant, nor was *investment in knowledge transfer*. As far as the "Organization" was concerned, neither the type of organization (healthcare facility, RHA, provincial government) nor its size proved significant.

Physicians

Six variables proved predictive of research utilization by Alberta physicians, as shown in Figure 2. As with the decision-makers, *person-to-person contact with researchers (relational capital)* and *exposure to research-oriented products and events (linkage mechanisms)* were significantly related to research utilization by physicians.

In the "Individual" category, of the three *physician specialties* considered in this study, laboratory medicine was negatively associated with research utilization, whereas surgery was positively associated. The third specialty, general medicine, was not significantly associated with utilization in either direction. *Number of years since graduation* was significantly and positively associated with research utilization.

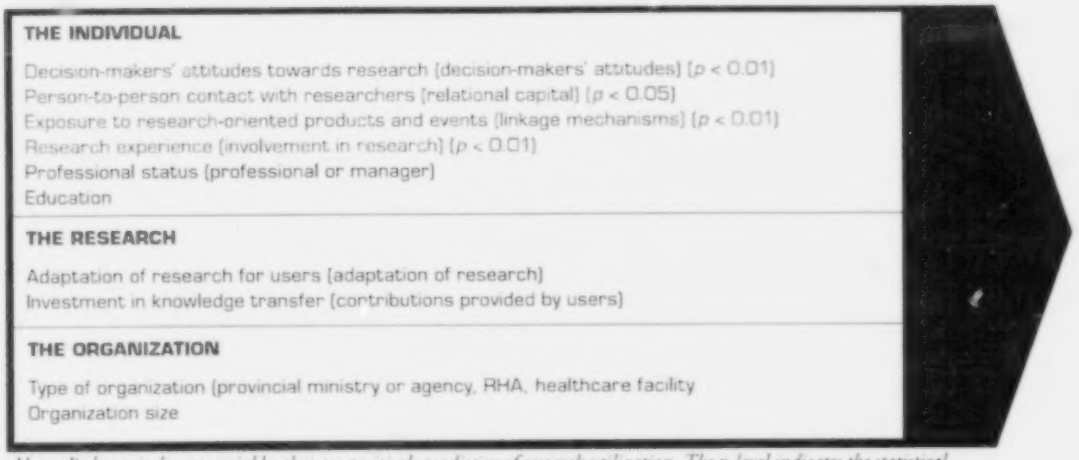
In the "Research" category, *investment in knowledge transfer (contributions provided by users)* was negatively associated with research utilization. In other words, physicians who reported that research users in their professional field organized events and training activities, invested in research transfer, and developed new interventions, approaches, or delivery systems for research transfer, were generally less involved in research utilization. This finding is difficult to understand intuitively. *Acquisition efforts* were also predictive of research utilization for physicians. Those physicians who indicated greater use of research were more likely to report giving greater importance to research that defined the intended users or beneficiaries of the project's results and described dissemination goals and strategies; they also found it important to communicate with the researchers to discuss the usefulness and application of research evidence.

Variables that were not predictive of research utilization for physicians were their *attitudes toward research* and *adaptation of research* for the benefit of users.

Nurses

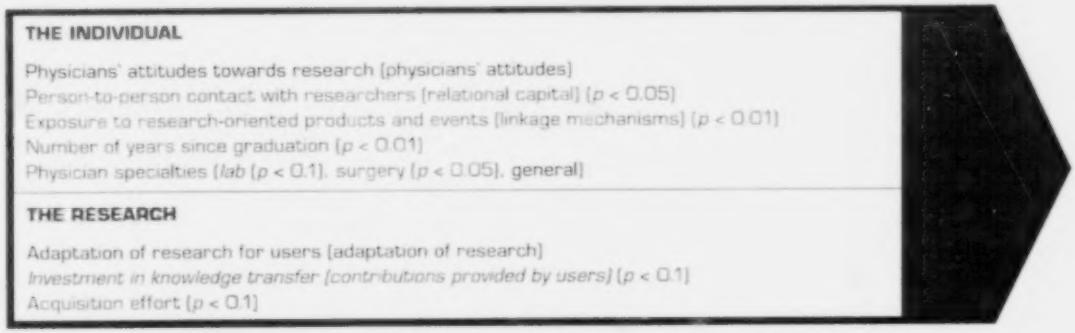
Seven variables were significant predictors of research utilization among nurses, as shown in Figure 3. Nurses' research utilization behaviour was similar to that of decision-makers and physicians

Figure 1. Determinants of research utilization for Alberta decision-makers


THE INDIVIDUAL
Decision-makers' attitudes towards research (decision-makers' attitudes) (p < 0.01)
Person-to-person contact with researchers (relational capital) (p < 0.05)
Exposure to research-oriented products and events (linkage mechanisms) (p < 0.01)
Research experience (involvement in research) (p < 0.01)
Professional status (professional or manager)
Education
THE RESEARCH
Adaptation of research for users (adaptation of research)
Investment in knowledge transfer (contributions provided by users)
THE ORGANIZATION
Type of organization (provincial ministry or agency, RHA, healthcare facility
Organization size
Research Utilization

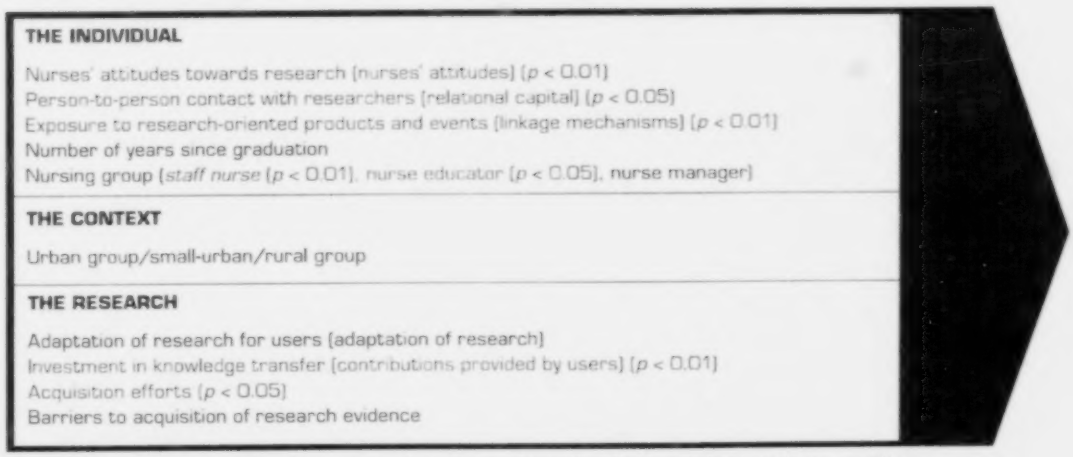
Note: Red type indicates variables that are positively predictive of research utilization. The p *level indicates the statistical significance of the relationship.*

Figure 2: Determinants of research utilization for Alberta physicians


THE INDIVIDUAL
Physicians' attitudes towards research (physicians' attitudes)
Person-to-person contact with researchers (relational capital) (p < 0.05)
Exposure to research-oriented products and events (linkage mechanisms) (p < 0.01)
Number of years since graduation (p < 0.01)
Physician specialties (lab (p < 0.1), surgery (p < 0.05), general)
THE RESEARCH
Adaptation of research for users (adaptation of research)
Investment in knowledge transfer (contributions provided by users) (p < 0.1)
Acquisition effort (p < 0.1)
Research Utilization

Note: Red type indicates variables that are positively predictive of research utilization. Italic type indicates variables that are negatively predictive of research utilization. The p *level indicates the statistical significance of the relationship.*

Figure 3: Determinants of research utilization for Alberta nurses


THE INDIVIDUAL
Nurses' attitudes towards research (nurses' attitudes) (p < 0.01)
Person-to-person contact with researchers (relational capital) (p < 0.05)
Exposure to research-oriented products and events (linkage mechanisms) (p < 0.01)
Number of years since graduation
Nursing group (staff nurse (p < 0.01), nurse educator (p < 0.05), nurse manager)
THE CONTEXT
Urban group/small-urban/rural group
THE RESEARCH
Adaptation of research for users (adaptation of research)
Investment in knowledge transfer (contributions provided by users) (p < 0.01)
Acquisition efforts (p < 0.05)
Barriers to acquisition of research evidence
Research Utilization

Note: Red type indicates variables that are positively predictive of research utilization. Italic type indicates variables that are negatively predictive of research utilization. The p *level indicates the statistical significance of the relationship.*

on two variables: for all three occupational groups, *person-to-person contact with researchers (relational capital)* and *exposure to research-oriented products and events (linkage mechanisms)* were predictors. As with decision-makers, attitude toward research was also a significant and positive predictor. This indicates that nurses (and decision-makers) who made more frequent use of research were more likely to believe that research was pertinent to their professional practice, met their needs and expectations, and was a preferred source of information.

Considering the nursing occupational subgroups, being a nurse educator was positively related to research utilization, and being a staff nurse was negatively associated. Being a nurse manager was not related to research utilization either positively or negatively.

As for the variables associated with the research itself, nurses who reported that *investment in knowledge transfer (contributions provided by users)* was prevalent in their field were more likely to report greater research utilization. This investment includes creating opportunities for transfer of research, organizing training activities which integrate research results, investing material or financial resources in knowledge transfer, and developing new approaches, interventions, or delivery systems based on research results. As with physicians, *acquisition efforts* were also positive predictors of research utilization by nurses.

Variables that were not predictors of research utilization by nurses were *context*, *number of years since graduation*, *adaptation of research for users*, and *barriers to the acquisition of research evidence*.

Summary: Determinants of research utilization for Alberta users

Four main themes emerge from a comparison across all three user groups of the determinants of research utilization (see also Table 7):

- Interaction and involvement: *Person-to-person contact with researchers (relational capital)* and *exposure to research-oriented products and events (linkage mechanisms)* were significant predictors of research utilization for all three user groups. In addition, the importance of *research involvement* must be noted; it was included in the regression analysis for decision-makers only, but it was significant for that group. These items speak to the importance of face-to-face contact and interaction between occupational groups and researchers, and of inviting involvement in research and research-related activities.
- Communication of research results: *Adaptation of research for users* was not a significant predictor of research utilization for any of the occupational groups investigated; however, *acquisition efforts* were predictive of research utilization for physicians and nurses (this independent variable was not included in the decision-maker questionnaire). As both of these variables concern the communication of research results, the findings are somewhat counter-intuitive. The results suggest that researchers should focus on clearly identifying the intended users and beneficiaries of the research and its dissemination goals and strategies, rather than on, for example, presenting results in non-technical language or developing graphically appealing reports. It may be that relationships between researchers and users which allow for discussion of research results are more important than the form in which research results are disseminated.
- Investment in knowledge transfer: For decision-makers and physicians, their perception of *investment in knowledge transfer (contributions provided by users)* was not a significant predictor of research utilization (although it was for nurses). Research, including this study, has found that contact, interaction, and relationships are important for research utilization. This finding is supported by reviewing the types of information sources used most frequently by the three user groups (see Table 3). It seems, for these two groups, that investing time and resources in events and processes framed as research or knowledge transfer is not significantly associated with increased research utilization.
- Research appreciation: *Users' attitudes toward research* was predictive of research utilization for decision-makers and nurses, but not for physicians. It makes sense that if users find research to be pertinent to their practice, if it meets their needs and expectations, and is a preferred source of information, they will be more likely to make use of it. It is curious that this variable was not associated with research utilization for physicians; but this finding, as well as the third finding (*contributions provided by users*), may simply be a product of the pro-research bias of the physician sample.

In addition to the above summary, two other findings deserve comment: First, this study found that being a nurse educator or a surgeon was positively related to research utilization; there

Table 7. Comparison of the determinants of research utilization for Alberta users

Independent Variable	Decision-makers	Physicians	Nurses
Users' attitudes towards research			
Relational capital			
Linkage mechanisms			
Contributions provided by users			
Acquisition efforts	n/a		
Research involvement		n/a	n/a

Note: Shaded cells indicate those variables that were predictive of research utilization by Alberta users

was, however, no such relationship for either of the decision-maker subgroups (i.e., professional, manager). It is likely that roles within the clinical setting are much more distinct than in the administrative setting when it comes to research utilization, so that conclusions drawn about research utilization in the clinical setting must take into consideration the roles of the various occupational subgroups. Second, *number of years since graduation* was associated with research utilization for physicians, but not for nurses. Again, when making decisions about research utilization in clinical settings, it is important to consider the professional trajectories of physicians and nurses. Nurses are likely to be promoted into management roles over time, and may be more inclined toward administration than research. Promotion into administrative roles would not be the case, at least to the same extent, for physicians.

Determinants of research transfer

Determinants of research transfer are those factors that predict researchers' engagement in research transfer (in contrast to research use by users). Here again, regression analyses were performed; the results, which highlight the most significant variables associated with research transfer for researchers, are given in Figure 4. The results are divided into the same three categories as with users (the "Individual", the "Research", and the "Organization"), but are further divided by the two subgroups: researchers in medical schools, and researchers conducting health research in faculties other than medicine (the "supplementary sample").

Six out of the nine variables that were examined predicted research transfer by the medical school researchers. A *focus on users' needs* was positively and significantly related to the medical school researchers' engagement in research transfer. Other positive predictors were *person-to-person contact (relational capital)*; the researcher's *experience (number of years since graduation)*, a *focus on the advancement of scholarly knowledge*, and the presentation of research results in non-technical language *(adaptation of research results for users)*. Finally, the medical school researchers' *work environment* was important: conducting research in a hospital, or in a hospital as well as a university (rather than a university alone), was positively associated with research transfer.

By contrast with these findings, only three variables indicated the extent of engagement in research transfer by the supplementary sample researchers. As with the medical school researchers, *relational capital* and the *adaptation of research results for users* predicted engagement in research transfer for these researchers. On the other hand, the number of years of *experience as a healthcare provider or manager* predicted research transfer for researchers in the supplementary sample, but not for those in the medical school sample: the more years of experience the supplementary sample researchers had in these roles, the more inclined they were to use research.

Interestingly, *exposure to research-oriented products and events (formal linkage mechanisms)* and *dissemination efforts* were not significant for either medical school or supplementary sample researchers. In other words, none of the following linkage activities were associated with engagement in research transfer: presenting at conferences; participating in workshops organized by research users; participating in expert groups or committees; being involved in producing newsletters and other information delivered directly to intended users; sending reports to users via e-mail; publishing project information on the Internet; delivering project information through existing networks; publishing articles in newspapers; participating in radio and television programs; and meeting with people regarding projects. Nor were the dissemination efforts listed on the scale (defining in research projects the intended users and describing dissemination goals and strategies; ensuring personal follow-up with users to assess how useful project information was and how easily it could be applied; and involving users in such roles as co-investigators, advisory committees, and the definition of the research question) predictive of research transfer effort.

Summary: Determinants of engagement in research transfer for researchers

Three of the findings for medical school researchers can be explained, not surprisingly, as the importance of person-to-person contact and interaction between researchers and users: (a) A *focus on users' needs* implies that researchers have worked with users to determine their needs and then incorporated

those needs into their research projects. (b) Frequent contact *(relational capital)* with users in various roles and work settings is obviously important to research transfer. (c) Conducting research in *hospital settings* means that researchers are likely to have greater interaction with users and may produce more studies with a clinical or population focus, the findings of which may be more transferable than basic biomedical studies.

It is interesting, and perhaps contrary to what would be expected, to note that research does not have to be heavily practice-, policy-, or action-oriented, but can be predictive of research transfer for medical school researchers if it has a *focus on the advancement of scholarly knowledge*. Finally, results suggest that when medical researchers make extra effort to *adapt research results for users*, they are more inclined toward research transfer. Thus, these results suggest that the advancement of scholarly knowledge and meeting the needs of users are not contradictory behaviours, as both were positively associated with the medical school researchers' engagement in research transfer activities.

Only three variables predicted research transfer among supplementary sample researchers. It is possible that this group was so eclectic that commonalities among them were difficult to find. Medical school researchers shared two of these three variables: *adaptation of research results for users* and *relational capital*. The importance researchers placed on adapting their research results to be user-friendly should not be underestimated; and once again, the importance of person-to-person contact between researchers and users rises above that of all other variables.

For the supplementary sample, the importance of the number of years of *experience as a healthcare provider or manager* may be linked both to the grouping of researchers into "basic" and "applied", and to the importance of contact with users. Most of the supplementary sample were applied researchers (79.5%), and the nature of that type of research tends to involve working with others to identify, address, and solve clinical and managerial problems, in order to bring about changes to policy and practice. If these researchers have had many years in the practice or administration setting, they may be better able to maintain their "user" perspective; they may more readily build relationships or interact with users, which in turn may make them more interested in and more inclined toward research transfer.

In additional analyses, researchers were grouped according to whether they were basic or applied researchers, and whether they practised in medical schools or in other faculties (the supplementary sample); then the *kind* of dissemination activities they engaged in was examined. Dissemination activities were divided into two categories:

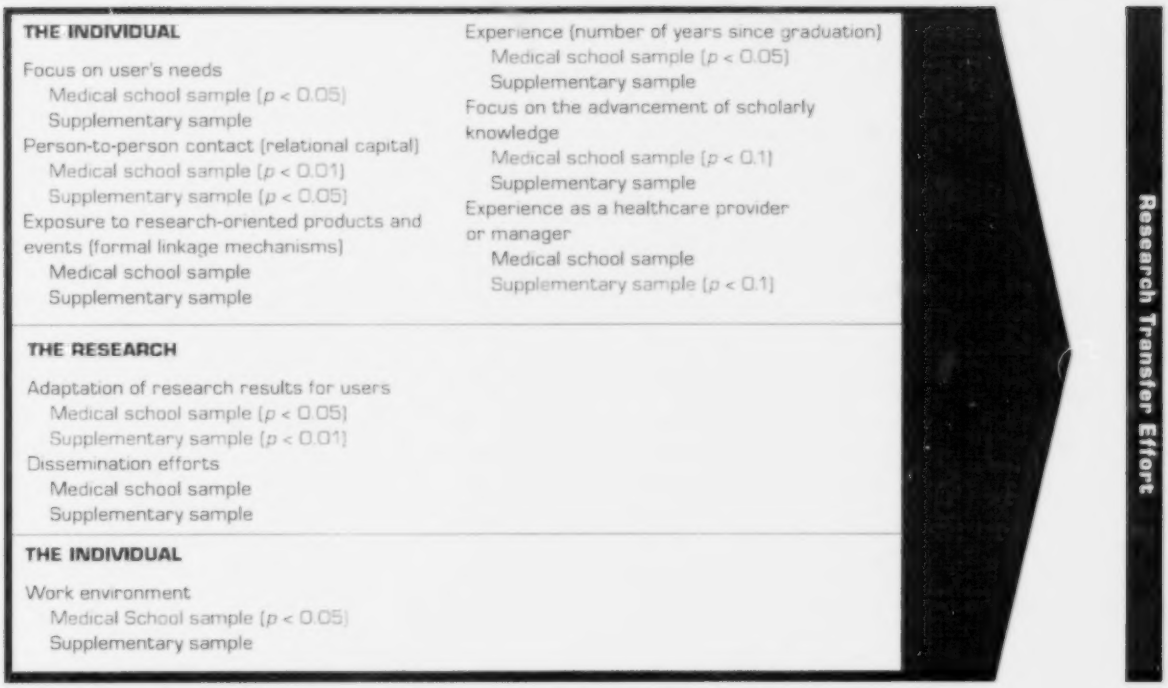
> "Plain dissemination" included dissemination activities that were more passive, and involved modifying research reports and sending results to users (presenting results in non-technical language; providing examples of how to use results; making reports appealing through the use of graphics, colour, humour, packaging; preparing reports on specific topics for policy-makers; and sending results to users).
>
> "Engaged dissemination" included activities that were more interactive, entailing personal follow-up with users (to assess how useful the project was and how easily it could be applied) and involvement of users in the research (as co-investigators, on advisory committees, and in defining the research question).

These additional analyses demonstrated that there are important differences in the kind of dissemination activities engaged in: applied and basic researchers differed in their approach, as did those working in medical schools and those in other faculties (i.e., the supplementary sample). Applied researchers and the supplementary sample researchers were involved more frequently in both plain and engaged dissemination activities; they also published significantly less than basic researchers and the medical school sample. To add to this understanding, the number of research personnel employed by a researcher was compared to the number of publications that researcher produced. It was found that the more research personnel working for a researcher, the higher the number of publications produced.

As a result of this analysis, three points need to be considered:

- Much of the important contribution of researchers to research utilization comes largely in the form of dissemination activities that fall outside the framework of scientific publication.
- Publication is not directly related to research use; the impact of publications on users is indirect and probably works through more than one mechanism (for example, source for clinical practice guidelines and source for dissemination material).

Figure 4. Determinants of research transfer effort for Alberta researchers


THE INDIVIDUAL
Focus on user's needs
Medical school sample ($p < 0.05$)
Supplementary sample
Person-to-person contact (relational capital)
Medical school sample ($p < 0.01$)
Supplementary sample ($p < 0.05$)
Exposure to research-oriented products and events (formal linkage mechanisms)
Medical school sample
Supplementary sample
Experience (number of years since graduation)
Medical school sample ($p < 0.05$)
Supplementary sample
Focus on the advancement of scholarly knowledge
Medical school sample ($p < 0.1$)
Supplementary sample
Experience as a healthcare provider or manager
Medical school sample
Supplementary sample ($p < 0.1$)
THE RESEARCH
Adaptation of research results for users
Medical school sample ($p < 0.05$)
Supplementary sample ($p < 0.01$)
Dissemination efforts
Medical school sample
Supplementary sample
THE INDIVIDUAL
Work environment
Medical School sample ($p < 0.05$)
Supplementary sample
Research Transfer Effort

Note: Red type indicates variables that are positively predictive of research transfer effort. The p level indicates the statistical significance of the relationship

- The fact that researchers in this study who were involved in dissemination activities had lower publication records suggests that the career path for a "successful" researcher is not a dissemination path.

Determinants of research utilization for users and researchers

Three major discrepancies emerge when one compares the determinants of research utilization for users and the determinants of research transfer for researchers. Clearly, there are some major differences, whether real or perceived, between users and researchers in these three areas. Understanding them in greater detail may have important implications for facilitating research transfer and utilization by these groups.

Linkage mechanisms

For all user groups (decision-makers, physicians, and nurses), *exposure to research-oriented products and events* was positively and significantly associated with research utilization. Conversely, these *formal linkage mechanisms* were not associated with research transfer effort for either medical school or supplementary sample researchers. This may suggest a basic divide between the needs of users and those of researchers, or it may suggest different perceptions of the importance of these kinds of research transfer opportunities.

Acquisition efforts (users) vs. dissemination efforts (researchers)

Physicians and nurses reported a positive influence on utilization when research defined the intended users of the project's results; when it described dissemination goals and strategies; when users could communicate with researchers to discuss the usefulness of research evidence; and when the evidence could easily be applied. Conversely, when researchers were asked about how frequently their projects met these criteria and how often their projects involved users in various roles in the project, it was found that the dissemination efforts variable was not significantly associated with research transfer effort for the medical school researchers or the supplementary sample.

Adaptation of research

The results from users (decision-makers, physicians, and nurses) suggested that the *adaptation of research for users* was not related to research use. On the other hand, the *adaptation of research* was one of the two variables significantly related to research transfer for both medical school and supplementary sample researchers. Further research will be required to determine why the adaptation of research for the benefit of users does not seem important to users, yet appears to be important to researchers.

Conclusions

The surveys of decision-makers, physicians, nurses, and researchers, along with the resulting technical reports, represent a large investment of time and resources; and those involved have been keen, therefore, to maximize the usefulness of this foundational work. A workshop was held on March 24, 2004, with participation by key Alberta stakeholders, to reflect on the study's results. (See Appendix D for a list of workshop participants.) The purpose of the workshop was to consolidate what had been learned from the research utilization surveys and to recommend next steps toward enhancing health research utilization in Alberta. The main findings from the surveys, together with comments from the workshop participants are reflected in the conclusions that follow.

1. **Relationships foster research transfer and utilization.**
To facilitate research uptake, users and researchers must interact. The importance of *linkage mechanisms* cuts across all user groups; the importance of *relational capital* cuts across all user groups and across both researcher groups. This is not unique to Alberta. In research conducted among similar user groups across Canada, the same two determinants repeatedly emerged as significant for predicting research utilization among users (Landry, Amara & Lamari, 1998; Landry, Amara, & Lamari, 2001b). Time invested in networking and developing relationships is time well spent; however, this is often a luxury in the current healthcare system. Unfortunately, connecting or interacting with others does not immediately translate into deliverables, measurable outcomes, or publications; and consequently, these are not activities that users and researchers are generally rewarded for engaging in, as critical as they are to research utilization.

2. **It is important to encourage organizational cultures that support research transfer and utilization.**
Creating opportunities for interaction is critical for research utilization; and this, in turn, reflects the ability of organizations to create or foster conditions which encourage research use. Both researcher and user organizations could encourage interaction by supporting and financing policy forums, symposia, business lunches; they could defray the expense of travel for meetings and other expenditures required to enhance relational capital. Organizations could send users and researchers to conferences; they could allow work time to be spent on committees where users and researchers interact. Beyond that, organizations should establish incentives for transfer and utilization of research. Indeed, as workshop participants indicated, there is a business case for these research transfer and utilization activities, and this needs to be articulated more emphatically. The participants also pointed to stable and secure leadership as a key to valuing research and to facilitating research exchange within organizations.

3. **Users must consider research relevant and credible in order for knowledge transfer and utilization to take place.**
Within all user groups, positive attitudes toward research should be encouraged and fostered. Obviously, if users do not feel or think research is relevant to them, they will not use it. Activities for users should be aimed at demonstrating how research may be pertinent or useful to their work, so that users come to view research as a preferred source of information. Activities aimed at researchers should stress the importance of linking their research with users' needs, so that researchers believe that their research is seen as credible and that it has an impact on users. Such activities will generate positive attitudes toward research and should increase both the transfer and utilization of research.

4. **Specific roles and responsibilities within occupational groups may optimize research transfer and utilization.**
If research utilization is to be improved, the roles of users and researchers who are more inclined toward research utilization or transfer need to be considered. For example, the intermediary role of the nurse educator—filled by nurses who bridge the gap and "translate" research evidence—appeared in this study as positively and strongly supportive of research utilization; and that needs to be recognized by the health system as a possible way to improve research transfer, at least in nursing. Additionally, the roles and functions of people who do this work (frequently without a title suggesting their importance in terms of research transfer or utilization) should be recognized, and the people who are already engaged in this activity should be acknowledged. Specifically on the transfer side, because of the varying roles within occupational user groups and the responsibilities that accompany these roles, a multi-dimensional approach to research transfer should be taken; research results should be tailored to each group.

5. **The non-significance to decision-makers and physicians of contributions by users needs to be addressed.**
The appreciation within the nursing setting of contributions by users should continue to be encouraged while the curious finding that such user input was not significant for decision-makers and physicians should be examined. Why is it that such efforts as creating opportunities for transfer of research, and organizing training activities which integrate research results, are positively related to research utilization for Alberta's nurses, but not for decision-makers and physicians?

6. **Further research is needed on the main contradictions between researchers and users.**
The three main "disconnects" between users and researchers—exposure to research-oriented products and events versus formal linkage mechanisms; acquisition efforts versus dissemination efforts; and adaptation of research for users versus adaptation of research—need to be studied further.

Questions for Future Consideration

Expanding on some of the conclusions above, participants in the March 24 workshop asserted that knowledge transfer and utilization should be acknowledged as a process, which proceeds in steps. Uptake and exchange of information should be considered at every stage in the research cycle, not just at a single point, or at the end point. Participants also affirmed the importance of the informal learning that underlies many strategies which facilitate knowledge transfer and utilization, and they recommended the development of a local "clearing house" for identifying and disseminating research. Finally, workshop participants noted other programs and activities in the area of research utilization that people need to be aware of. (These are listed in Appendix E.)

At the end of the workshop, participants developed a list of outstanding research questions which should be considered in future knowledge transfer and utilization studies:

- What is the business case for knowledge transfer and knowledge utilization? What is the connection between research utilization and better health outcomes? There needs to be a better understanding of the linkages between knowledge transfer and patient health, and the operations of the health system.
- What do "intermediaries" look like? What are their qualities, and what do they do? This study identified intermediaries in nursing, but not in the other professions.
- What do research transfer and utilization look like in specific populations? More research needs to be done within specific populations—including the physician population, where the sample for this study was small.
- What are the barriers to evidence use by users?
- Is there evidence that collaborative research is transferred better than individual research?
- How can dissemination and uptake in academic circles be rewarded?
- How can we best communicate what research utilization is? A good deal of specialist terminology is used in this area (knowledge exchange, knowledge translation, evidence-based practice), and common interests are sometimes labelled quite differently.

Participants summed up the workshop, echoing the question that informed this study and will motivate future studies like it:

How can health research be translated into policy in Alberta?

A Final Note

Alberta is well along the road to treating research transfer and utilization seriously. Many programs and initiatives in the province are combining research and practice. Alberta healthcare organizations have good recognition of issues such as "research use" and "knowledge transfer", and researchers are becoming more informed, more creative, and more active in their dissemination efforts. This project, throughout its various phases—design, data interpretation, and reflecting on the meaning of the findings for Alberta stakeholders—has tried to model an interactive and respectful process of knowledge generation and use.

It is with great excitement that we share these results from the surveys of decision-makers, physicians, nurses, and researchers. The results have not only contributed to knowledge about the factors influencing use of research in Alberta; they have also provided useful information for AHFMR and others involved in planning activities and programs to enhance the impact of research in Alberta. This study, and future research in this area, will very likely be used to design an instrument for assessing research utilization and interventions—making a significant contribution to this rapidly evolving field. The results of these surveys, along with Alberta's will to work toward improving research dissemination and utilization efforts, situate it as a national leader in this field.

(Notes)

[1] The study was funded by Health Canada, through a grant from the National Health Research and Development Program. Dr. Landry is supported through a Chair in Health Research Utilization from the Canadian Health Services Research Foundation.

[2] In addition to the financial support from AHFMR, the Alberta study also received funding from Alberta Health and Wellness (through the Health Research Collaboration Agreement) and Health Canada (through the National Health Research and Development Program).

[3] Decision-makers, physicians, nurses, and researchers.

[4] Comparisons between Alberta and the rest of Canada are not included in this report, but are available in the technical reports which discuss the specific occupational groups. Comparable results are not available for nurses, as this group was surveyed in Alberta only.

[5] The Health Evidence Applications and Linkage Network (HEALNet) was a national network of researchers from disciplines throughout the health, social, and applied sciences, whose common aim was to better the health of Canadians by improving decision-making at all levels in the healthcare system. The network ceased operations in 2002.

[6] The analysis of nurses by region size and occupational subgroup was very detailed and goes far beyond what is presented in this report. Anyone who is interested in this information is encouraged to review the technical report of the nurses' survey on the Knowledge Utilization Studies Program website. It is interesting to note, however, that nurses in urban centres reported spending significantly more time acquiring and analyzing research than nurses working in small urban and rural areas. Staff nurses reported spending the most time on clinical practice; nurse educators, on teaching and on acquiring and analyzing research; and managers, on administration. Overall, regardless of region, teaching and research is done by educators, clinical practice by staff nurses, and administration by managers. It was observed that nurse educators act as research-transfer intermediaries within this occupational group; and it was therefore concluded that this group is particularly important to nurses' ability to use research.

[7] The Alberta study was an extension of the national study (2000) funded by Health Canada, entitled "Utilization of Health Research Results in Canada"; the principal investigator was Dr. Réjean Landry of the Department of Management at Université Laval.

References

Dunn, W. N. (1980). The two communities metaphor and models of knowledge use: An exploratory case study. *Knowledge: Creation, Diffusion, Utilization, 1*(4), 515–536.

Haynes, R. B. (1993). Some problems in applying evidence in clinical practice. In K. S. Warren & F. Mosteller (Eds.), Doing More Good than Harm: The Evaluation of Health Care Interventions (pp. 210–224). *Annals of the New York Academy of Sciences, 703*(1), 210–224.

Huberman, M., & Thurler, G. (1991). *De la recherche à la pratique: Éléments de base.* Bern: Peter Lang SA, Éditions scientifiques européennes.

Kline, S. J., & Rosenberg, N. (1986). An overview of innovation. In Landau, R., & Rosenberg, N. (Eds.), *The Positive Sum Strategy: Harnessing Technology for Economic Growth* (pp. 275–306). Washington, DC: National Academy Press.

Knott, J., & Wildavsky, A. (1980). If dissemination is the solution, what is the problem? *Knowledge: Creation, Diffusion, Utilization, 1*(4), 537–578.

Landry, R. (1990). Barriers to efficient monitoring of science, technology and innovation through public policy. *Journal of Science and Public Policy, 16*(6), 345–352.

Landry, R., Amara, N., & Lamari, M. (1998, May/June). Utilization of social science research knowledge in Canada. Paper presented at the meeting of the Canadian Political Science Association, Ottawa, ON.

Landry, R., Amara, N., & Lamari, M. (2001a). Utilization of social science research knowledge in Canada. *Research Policy 30*(2), 333–349.

Landry, R., Amara, N., & Lamari, M. (2001b). Climbing the ladder of research utilization: Evidence from social science research. *Science Communication, 22*(4), 396–422.

Landry R., Amara, N., & Ouimet, M. (2003). Milieux innovateurs: determinants and policy implications. Paper presented at the DRUID Summer Conference 2003 on Creating, Sharing, and Transferring Knowledge: The Role of Geography, Institutions, and Organizations. Retrieved November 12, 2004, from http://www.druid.dk/conferences/summer2003/Papers/AMARA_LANDRY_OUIMET.pdf

Landry, R., Lamari, M., & Amara, N. (2003). Extent and determinants of utilization of university research in public administration. *Public Administration Review, 63*(2), 191–204.

Lavis, J. N., Ross, S. E., Hurley, J. E., Hohenadel, J. M., Stoddart, G. L., Woodward, C. A., & Abelson, J. (2002). Examining the role of health services research in public policymaking. *The Milbank Quarterly, 80*(1), 125–154.

Lester, J. P. (1993). The utilization of policy analysis by state agency officials. *Knowledge: Creation, Diffusion, Utilization, 14*(3), 267–290.

Lester, J. P., & Wilds, L. J. (1990). The utilization of public policy analysis: A conceptual framework. *Evaluation and Program Planning, 13*(3), 313–319.

Leung, P. (1992). Translation of knowledge into practice. In Walcott and Associates, NIDRR National CRP Panel—Final report. Washington, DC: Walcott and Associates.

Lomas, J. (1997). Research and evidence-based decision making. *Australian and New Zealand Journal of Public Health, 21*(5), 439–441.

Peachey, D. K., & Linton, A. L. (1990). Guidelines for medical practice: 2. A possible strategy. *Canadian Medical Association Journal, 143*(7), 629–632.

Valente, T. W., & Rogers, E. M. (1995). The origins and development of the diffusion of innovations paradigm as an example of scientific growth. *Journal of Science Communication, 16*(3), 242–273.

Weiss, C. H. (1979). The many meanings of research utilization. *Public Administration Review, 29,* 426–431.

Yin, R. K., & Moore, O. B. (1988). Lessons on the utilization of research from nine case experiences in the natural hazards field. *Knowledge in Society: the International Journal of Knowledge Transfer, 1*(3), 25–44.

APPENDIX A

Objectives of the National Study

The national study[7] on which this Alberta study was modelled aimed to evaluate the use of health research results in the Canadian healthcare system, and to narrow the gap between the generation and use of disseminated research. Its key objectives were to identify

- how healthcare providers and managers currently make use of health research results;
- factors influencing healthcare providers' and decision-makers' use of health research results;
- determinants of effective dissemination and adaptation of research results by health researchers for uptake by providers and decision-makers;
- determinants of effective linkage mechanisms and interactions between researchers and healthcare providers and decision-makers;
- practical lessons for improving research utilization programs through better understanding of its determinants.

APPENDIX B

Alberta Advisory Group

Primary investigator:

Dr. Judy Birdsell
Principal
On Management Ltd.

Co-investigators:

Dr. Carole Estabrooks
Associate Professor, Faculty of Nursing
Principal Investigator, Knowledge Utilization Studies Program
University of Alberta

Dr. Paul Hasselback
Senior Medical Health Officer
Interior Health

Dr. Peter Norton
Professor and Head, Department of Family Medicine
University of Calgary

Dr. Kerrie Pain
Principal
Kingfisher Research and Evaluation

Richard Thornley
Manager, Evaluation, Analysis, & Information Services
Alberta Heritage Foundation for Medical Research

Brenda Waye-Perry
Director, Research
Alberta Mental Health Board

Sylvia Wilson
Manager, Research and Knowledge Programs
Alberta Health and Wellness

APPENDIX C

Stakeholder Representatives Involved in Analyses

Individuals involved in the analysis and discussions of survey results are listed below, with their affiliations as of March 2005. Several names are missing, as it was not possible to contact those participants before publication to confirm their willingness to be identified in this report.

Linda Barrett
Manager, Community Research Ethics Board of Alberta
Alberta Heritage Foundation for Medical Research

Joan Berezanski
Director, Office of the Provincial Medical Care Consultant
Alberta Health and Wellness

Dr. Rollin Brant
Professor, Department of Statistics
University of British Columbia

Dr. Lesley Brown
Associate Professor, Department of Kinesiology
University of Lethbridge

Tim Caulfield
Associate Professor, Health Law Institute
University of Alberta

Dr. Ann Casebeer
Assistant Professor, Department of Community
Health Sciences
University of Calgary

Huey Chong
Data Manager, Faculty of Nursing
University of Alberta

Dr. Diane W. Cox
Professor, Faculty of Medicine and Dentistry
University of Alberta

Dr. Angela Downey
Co-Director, Centre for Health Management Research
Associate Professor of Accounting, Faculty of Management
University of Lethbridge

Jean Groft
Lecturer, School of Health Sciences
University of Lethbridge

Sarah Hayward
Director, Applied Health Research Programs
Alberta Heritage Foundation for Medical Research

Dr. Kathy Hegadoren
Canada Research Chair in Stress Disorders in Women
Associate Professor, Faculty of Nursing
University of Alberta

Dr. Norah Keating
Professor, Department of Human Ecology
University of Alberta

Dr. Kathryn King
Associate Professor, Faculty of Nursing
University of Calgary

Dr. Judith Kulig
Professor, School of Health Sciences
University of Lethbridge

Dr. Jacques Magnan
Vice President, Programs
Alberta Heritage Foundation for Medical Research

Suzanne Maisey
Manager, Planning and Evaluation
The Capital Care Group

Margaret Milner
Master's student, Faculty of Nursing
University of Alberta

Dr. Liz McGregor
Research Scientist
Alberta Cancer Board

Dr. Ken Ng
Assistant Professor, Department of Biological Sciences
University of Calgary

Dr. Karin Olson
Associate Professor, Faculty of Nursing
University of Alberta

Dr. Joanne Profetto-McGrath
Assistant Professor, Faculty of Nursing
Senior Research Fellow, Knowledge Utilization Studies Program
University of Alberta

Dr. Jane Smith
Geriatric Care, Glenrose Rehabilitation Hospital

Dr. Karran Thorpe
Associate Dean, School of Health Sciences
University of Lethbridge

Dr. Hans Vogel
Professor, Department of Biological Sciences
University of Calgary

Brenda Waye-Perry
Director, Research
Alberta Mental Health Board

Dr. Ted Weiden
Director of Research, Faculty of Social Work
University of Calgary

Christine Witt
Director, Development
East Central Health

APPENDIX D

Workshop Participants

Below are listed the individuals who participated in the final stakeholder workshop on March 24, 2004.

Adeniyi Adewale
Quantitative Data Analyst, Knowledge Utilization Studies Program
University of Alberta

Dr. Marion Allen
Associate Dean, Faculty of Nursing
University of Alberta

Dr. Judy Birdsell
Principal
On Management Ltd.

Marie-Andrée Chassé
Nursing Consultant, Policy and Practice
Alberta Association of Registered Nurses

Kelly Deis
Associate Director, Centre for Health Evidence
University of Alberta

Lori DeLuca
Project Consultant, Research and Evidence
Alberta Health and Wellness

Dr. Carole Estabrooks
Associate Professor, Faculty of Nursing
Principal Investigator, Knowledge Utilization Studies Program
University of Alberta

Dr. Sheila Evans
Associate Dean, Research, Faculty of Nursing
University of Calgary

George Flynn
Senior Manager, Special Projects
Alberta Health and Wellness

Pat Furey
Vice President, Health Services
Northern Lights Health Region

Cindy Gerdes
Executive Associate to Dr. T. E. Feasby
Vice President, Academic Affairs, Capital Health
Associate Dean, Faculty of Medicine and Dentistry
University of Alberta

Dr. George Goldsand
Professor Emeritus, Faculty of Medicine and Dentistry
University of Alberta

Sarah Hayward
Director, Applied Health Research Programs
Alberta Heritage Foundation for Medical Research

Sherryl Hoskins
Research Associate
Peace Country Health

Dr. Réjean Landry
Professor, Faculty of Business
Université Laval

Dr. Jacques Magnan
Vice President, Programs
Alberta Heritage Foundation for Medical Research

Dr. Kerrie Pain
Principal, Kingfisher Research and Evaluation
Research Leader, Rehabilitation
Calgary Health Region

Carol Rimmer
Director, Regional Research and Accreditation
Calgary Health Region

Richard Thornley
Manager, Evaluation, Analysis, & Information Services
Alberta Heritage Foundation for Medical Research

Dr. Lars Wallin
Postdoctoral Fellow, Faculty of Nursing
University of Alberta

Sylvia Wilson
Manager, Research and Knowledge Programs
Alberta Health and Wellness

Christine Witt
Director, Development
East Central Health

Judy Wry
Manager, Applied Health Research Programs
Alberta Heritage Foundation for Medical Research

APPENDIX E

Related Research Utilization Activities and Programs

Organization/Initiative	Brief Description
Research Transfer Network of Alberta (RTNA)	This province-wide network promotes the application of research to health practices in Alberta by helping people from various sectors connect with each other and facilitating access to information and learning opportunities. http://www.ahfmr.ab.ca/rtna/
Swift Efficient Application of Research in Community Health (SEARCH)	SEARCH is a partnership program helping health organizations support decisions about healthcare planning and priorities with sound, locally relevant evidence, through the development of their people. The purpose of the program is to increase the capacity throughout Alberta to acquire, aggregate, interpret, and apply health information to individual, regional, and provincial health decisions and programs, and to facilitate more effective management of the health system. http://www.ahfmr.ab.ca/search.shtml
Alberta Consultative Health Research Network (ACHRN)	ACHRN provides workshops and consultation services for Alberta health professionals interested in research and evaluation. The network has research development advisors who connect with health regions. http://www.achrn.org
Community Research Ethics Board of Alberta (CREBA)	Constituted in accordance with the Tri-Council Policy Statement (TCPS): Ethical Conduct for Research Involving Humans, CREBA is a multi-disciplinary committee with members from both rural and urban Alberta communities across the province. It fills a gap in Alberta by providing review of health research being conducted in any region, organization, or authority that does not have a duly constituted health research ethics board and process. http://www.ahfmr.ab.ca/creba/creba.shtml
Alberta Research Ethics Community Consensus Initiative (ARECCI)	ARECCI is a collaborative initiative involving AHFMR, research ethics boards, and health regions. It works toward a province-wide understanding to increase the clarity and efficiency of ethics review processes for research, program evaluation, and quality improvement.
Canadian Health Services Research Foundation (CHSRF): Local primary care initiatives	CHSRF has documented a number of primary care initiatives; for example, the Taber Integrated Primary Care Project: Turning Vision into Reality; Organizational Change in the Healthcare System with Special Reference to Alberta; Research Collective on the Organization of Primary Care Services in Quebec. http://www.chsrf.ca
CHSRF: EXTRA Program	EXTRA is a new strategic activity of the CHSRF whose primary goal is to give health system managers across Canada the skills to better use research in their day-to-day work, as a way to increase evidence-based decision-making in the health system. An executive engagement and capacity-building program that will influence the executive level in the province. http://www.chsrf.ca/extra/index_e.php
CHSRF: Self-assessment tool	CHSRF has developed a checklist for organizational self-assessment and capacity-building.
Centre for Health Evidence (CHE)	CHE uses innovation, instruction, and investigation to help health professionals put their best knowledge to work: engaging in projects and partnerships that promote practice-based evidence; facilitating the trend toward virtual communities; integrating knowledge and evidence in daily practice; working with professional organizations to determine what evidence they need to know; presenting different views of evidence depending on the role or questions of the user. http://www.cche.net/che/home.asp
Centre for Knowledge Transfer (CKT)	The Centre for Knowledge Transfer is a national graduate-student training centre in knowledge utilization and policy implementation relating to health services research. Its mission is to contribute to the improved transfer of knowledge for the betterment of health policy and healthcare services. Participating organizations include universities, research institutes, and regional health authorities; the centre is increasing efforts to engage with decision-makers and training researchers regarding dissemination. Administrative centre is housed at University of Alberta. http://www.ckt-ctc.ca/
Canadian Institutes of Health Research (CIHR)	CIHR is the major federal agency responsible for funding health research in Canada. To excel in the creation of new health knowledge, and to translate that knowledge from the research setting into real-world applications. CIHR funds a variety of network-based activities and knowledge-translation-oriented events and programs. http://www.cihr-irsc.gc.ca
Myth Busters	A series of essays to inform senior leadership: brief documents with current, high-level information based on evidence present the research evidence behind Canadian healthcare debates. http://www.chsrf.ca/mythbusters/index_e.php
Research groups in Alberta	Many research groups now have an explicit focus on applied health research or crossing boundaries between the university and community; e.g., the Centre for Health and Policy Studies (University of Calgary), Knowledge Utilization Studies in Practice (University of Alberta), Health Organization Studies in Business at University of Alberta, and the Rural Physician Action Plan.

About the Authors

Dr. Judy Birdsell is the principal of On Management Ltd., a company that consults to organizations in the healthcare, health research, and voluntary sectors. Dr. Birdsell has an M.Sc. in healthcare research and a Ph.D. in organizational analysis.

Richard Thornley is the manager of Evaluation, Analysis, and Information Services for the Alberta Heritage Foundation for Medical Research. Mr. Thornley has an M.L.I.S and an M.P.H. in health policy research.

Dr. Réjean Landry is a professor in the Department of Management at Université Laval in Québec, and holds the CHSRF/CIHR Chair on Knowledge Transfer and Innovation. Dr. Landry has an M.A. in social sciences and a Ph.D. in political science.

Dr. Carole Estabrooks is an associate professor in the Faculty of Nursing at the University of Alberta, and the principal investigator in the Knowledge Utilization Studies Program. Dr. Estabrooks has an M.N. and a Ph.D. in nursing.

Dr. Maria Mayan is the principal of Mayan Consulting and also maintains a position at the International Institute for Qualitative Methodology at the University of Alberta. She has a joint Ph.D. in organizational analysis and human ecology.